

material. Acid-forming or toxic-forming material shall not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution or otherwise violate the provisions of § 717.17 of this part.

(f) *Grading along the contour.* All final grading, preparation of earth, rock and other nonwaste materials before replacement of topsoil, and placement of topsoil in accordance with § 717.20, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation or placement along the contour would be hazardous to equipment operators, grading, preparation or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

§ 717.15 Disposal of excess rock and earth materials on surface areas.

Excess rock and earth materials produced from an underground mine and not disposed in underground workings or used in backfilling and grading operations shall be placed in surface disposal areas in accordance with requirements of § 715.15. Where the volume of such material is small and its chemical and physical characteristics do not pose a threat to either public safety or the environment, the regulatory authority may modify the requirements of § 715.15 in accordance with § 717.14(a)(1).

§ 717.16 [Reserved]

§ 717.17 Protection of the hydrologic system.

The permittee shall plan and conduct underground coal mining and reclamation operations to minimize disturbance of the prevailing hydrologic balance in order to prevent long-term adverse changes in the hydrologic balance that could result from underground coal mining operations, both on and off site. changes in water quality and quantity, in the depth to ground water, and in the location of surface water drainage channels shall be minimized and applicable Federal and State

statutes and regulations shall not be violated. The permittee shall conduct operations so as to minimize water pollution and shall, where necessary, use treatment methods to control water pollution. The permittee shall emphasize underground coal mining and reclamation practices that will prevent or minimize water pollution and changes in flows in preference to the use of water treatment facilities prior to discharge to surface waters. Practices to control and minimize pollution include, but are not limited to, diverting water from underground workings or preventing water contact with acid- or toxic-forming materials, and minimizing water contact time with waste materials, maintaining mine barriers to enhance postmining inundation and sealing, establishing disturbed areas through grading, diverting runoff, achieving quick growing stands of temporary vegetation, and lining drainage channels. If treatment is required to eliminate pollution of surface or ground waters, the permittee shall operate and maintain the necessary water treatment facilities as set forth in this section.

(a) *Water quality standards and effluent limitations.* (1) All surface drainage from the disturbed area, including disturbed areas that have been graded, seeded or planted and which remain subject to the requirements of this section, except for drainage from disturbed areas that have met the requirements of § 717.20 shall be passed through a sedimentation pond or a series of sedimentation ponds prior to leaving the permit area. All waters which flow or are removed from underground operations or underground waters which are removed from other areas to facilitate mining and which discharge to surface waters must be passed through appropriate treatment facilities prior to discharge where necessary to meet effluent limitations.

(2) For purposes of this section only, disturbed areas shall include areas of surface operations but shall not include those areas in which only diversion ditches, sedimentation ponds, or roads are installed in accordance with this section and the upstream area is not otherwise disturbed by the permittee. Disturbed areas shall not include

Surface Mining Reclamation and Enforcement, Interior

§ 717.17

those surface areas overlying the underground working unless those areas are also disturbed by surface operations such as fill (disposal) areas, support facilities areas, or other major activities which create a risk of pollution.

(3) The regulatory authority may grant exemptions from this requirement only when the disturbed drainage area within the total disturbed area is small and if the permittee shows that sedimentation ponds are not necessary to meet effluent limitations of this paragraph and to maintain water quality in downstream receiving waters. Sedimentation ponds required by this paragraph shall be constructed in accordance with paragraph (e) of this section in appropriate locations prior to any mining in the affected drainage area in order to control sedimentation or otherwise treat water in accordance with this paragraph. Discharges from areas disturbed by underground operation and by surface operation and reclamation activities conducted thereon, must meet all applicable Federal and State regulations and, at a minimum, the following numerical effluent limitations:

EFFLUENT LIMITATIONS, IN MILLIGRAMS PER LITER, MG/L EXCEPT FOR PH

Effluent characteristics	Maximum allowable ¹	Average of daily values for 30 consecutive discharge days ¹
Iron, total	7.0	3.5
Manganese, total	4.0	2.0
Total suspended solids ²	70.0	35.0
pH ³	(⁴)	(⁴)

¹ Based on representative sampling.

² In Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming, total suspended solids limitations will be determined on a case-by-case basis, but they must not be greater than 45/mg/l (maximum allowable) and 30 mg/l (average of daily value for 30 consecutive discharge days) based on a representative sampling.

³ Where the application of neutralization and sedimentation treatment technology results in inability to comply with the manganese limitations set forth, the regulatory authority may allow the pH level in the discharge to exceed to a small extent the upper limit of 9.0 in order that the manganese limitations will be achieved.

⁴ Within the range 6.0 to 9.0.

(i) Any overflow or other discharge of surface water from the disturbed area within the permit area demonstrated by the permittee to result from a precipitation event larger than the 10-year 24-hour frequency event will not be

subject to the effluent limitations of paragraph (a).

(ii) The permittee shall install, operate, and maintain adequate facilities to treat any water discharged from the disturbed area that violates applicable Federal or State regulations or the limitations of paragraph (a). If the pH of waters to be discharged from the disturbed area is normally less than 6.0, an automatic lime feeder or other neutralization process approved by the regulatory authority shall be installed, operated, and maintained. If the regulatory authority finds that small and infrequent treatment requirements to meet applicable standards do not necessitate use of an automatic neutralization process, and the mine normally produces less than 500 tons of coal per day, the regulatory authority can approve the use of a manual system if the permittee agrees to insure that consistent and timely treatment is carried out.

(iii) The effluent limitations for manganese shall be applicable only to acid drainage.

(b) *Surface water monitoring.* (1) The permittee shall submit for approval by the regulatory authority a surface water monitoring program which meets the following requirements:

(i) Provides adequate monitoring of all discharge from the disturbed area and from the underground operations.

(ii) Provides adequate data to describe the likely daily and seasonal variation in discharges from the disturbed area in terms of flow, pH, total iron, total manganese, and total suspended solids and, as requested by the regulatory authority, any other parameter characteristic of the discharge.

(iii) Provides monitoring at appropriate frequencies to measure normal and abnormal variations in concentration.

(iv) Provides an analytical quality control system including standard methods of analysis such as those specified in 40 CFR part 136.

(v) Within sixty (60) days of the end of each sixty (60) day sample collection period, a report of all samples shall be made to the regulatory authority, unless the discharge for which water

monitoring reports are required is subject to regulation by a National Pollution Discharge Elimination System (NPDES) permit issued in compliance with the Clean Water Act of 1977 (33 U.S.C. 1251–1378), (A) which includes equivalent reporting requirements, and (B) which requires filing of the water monitoring reports within 90 days or less of sample collection.

For such discharges, the reporting requirements of this paragraph may be satisfied by submitting to the regulatory authority on the same time schedule as required by the NPDES permit or within ninety (90) days following sample collection, whichever is earlier, either (1) a copy of the completed reporting form filed to meet the NPDES permit requirements, or (2) a letter identifying the State or Federal government official with whom the reporting form was filed to meet the NPDES permit requirements and the date of filing. In all cases in which analytical results of the sample collections indicate a violation of a permit condition or applicable standard has occurred, the operator shall notify the regulatory authority immediately. Where an NPDES permit effluent limitation requirement has been violated, the permittee should forward a copy of the Discharge Monitoring Report, EPA Form 3320-1, concurrently with notification of the violation.

(2) Equipment, structures, or other measures necessary to accurately measure and sample the quality and quantity of surface water discharges from the disturbed area of the permit area shall be properly installed, maintained and operated and shall be removed when no longer required.

(c) *Diversion and conveyance of overland flow away from disturbed areas.* In order to minimize erosion and to prevent or remove water from contacting toxic-producing deposits, overland flow from undisturbed areas may, as required or approved by the regulatory authority, be diverted away from disturbed areas by means of temporary or permanent diversion structures. The following requirements shall be met for such diversions:

(1) Temporary diversion structures shall be constructed to safely pass the peak runoff from a precipitation event

with a one year recurrence interval, or a larger event as specified by the regulatory authority. The design criteria must assure adequate protection of the environment and public during the existence of the temporary diversion structure.

(2) Permanent diversion structures are those remaining after mining and reclamation and approved for retention by the regulatory authority and other appropriate State and Federal agencies. To protect fills and property, to prevent water from contacting toxic-producing deposits, and to avoid danger to public health and safety, permanent diversion structures shall be constructed to safely pass the peak runoff from a precipitation event with a 100-year recurrence interval or a larger event as specified by the regulatory authority. Permanent diversion structures shall be constructed with gently sloping banks that are stabilized by vegetation. Asphalt, concrete, or other similar linings shall not be used unless specifically required to prevent seepage or to provide stability and they are approved by the regulatory authority.

(3) Diversions shall be designed, constructed, and maintained in a manner so as to prevent additional contributions of suspended solids to streamflow, or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall such contributions be in excess of requirements set by applicable State or Federal law. Appropriate sediment control measures for these diversions shall include, but not be limited to, maintenance of appropriate gradients, channel lining, vegetation, and roughness structures and detention basins.

(d) *Stream channel diversions.* In the event that the regulatory authority permits diversion of streams, the regulations of § 715.17(d) shall apply.

(e) *Sedimentation ponds*—(1) *General requirements.* Sedimentation ponds shall be used individually or in series and shall:

(i) Be constructed before any disturbance of the undisturbed area to be drained into the pond and prior to any discharge of water to surface waters from underground mine workings;

(ii) Be located as near as possible to the disturbed area and out of perennial streams, unless approved by the regulatory authority,

(iii) Meet all the criteria of the section.

(2) *Sediment storage volume.* Sedimentation ponds shall provide a minimum sediment storage volume.

(3) *Detention time.* Sedimentation ponds shall provide the required theoretical detention time for the water inflow or runoff entering the pond from a 10-year, 24-hour precipitation event (design event), plus the average inflow from the underground mine.

(4) *Dewatering.* The water storage resulting from inflow shall be removed by a nonclogging dewatering device or a conduit spillway approved by the regulatory authority. The dewatering device shall not be located at a lower elevation than the maximum elevation of the sedimentation storage volume.

(5) Each person who conducts underground mining activities shall design, construct, and maintain sedimentation ponds to prevent short-circuiting to the extent possible.

(6) The design, construction, and maintenance of a sedimentation pond or other sediment control measures in accordance with this section shall not relieve the person from compliance with applicable effluent limitations as contained in paragraph (a) of this section.

(7) There shall be no out-flow through the emergency spillway during the passage of the runoff resulting from the 10-year, 24-hour precipitation events and lesser events through the sedimentation pond, regardless of the volume of water and sediment present from the underground mine during the runoff.

(8) Sediment shall be removed from sedimentation ponds.

(9) An appropriate combination of principal and emergency spillways shall be provided to discharge safely the runoff from a 25-year, 24-hour precipitation event, or larger event specified by the regulatory authority, plus any inflow from the underground mine. The elevation of the crest of the emergency spillway shall be a Minimum of 1.0 foot above the crest of the principal spillway. Emergency spillway grades

and allowable velocities shall be approved by the regulatory authority.

(10) The minimum elevation of the top of the settled embankment shall be 1.0 foot above the water surface in the pond with the emergency spillway flowing at design depth. For embankments subject to settlement, this 1.0 foot minimum elevation requirement shall apply at all times, including the period after settlement.

(11) The constructed height of the dam shall be increased a minimum of 5 percent over the design height to allow for settlement, unless it has been demonstrated to the regulatory authority that the material used and the design will ensure against all settlement.

(12) The minimum top width of the embankment shall not be less than the quotient of $(H+35)/5$, where H , in feet, is the height of the embankment as measured from the upstream toe of the embankment.

(13) The combined upstream and downstream side slopes of the settled embankment shall not be less than 1v:5h, with neither slope steeper than 1v:2h. Slopes shall be designed to be stable in all cases, even if flatter side slopes are required.

(14) The embankment foundation area shall be cleared of all organic matter, all surfaces sloped to no steeper than 1v:1h, and the entire foundation surface scarified.

(15) The fill material shall be free of sod, large roots, other large vegetative matter, and frozen soil, and in no case shall coal-processing waste be used.

(16) The placing and spreading of fill material shall be started at the lowest point of the foundation. The fill shall be brought up in horizontal layers of such thickness as is required to facilitate compaction and meet the design requirement of this section. Compaction shall be conducted as specified in the design approved by the regulatory authority.

(17) If a sedimentation pond has an embankment that is more than 20 feet in height, as measured from the upstream top of the embankment to the crest of the emergency spillway, or has a storage volume of 20 acre-feet or more, the following additional requirements shall be met:

(i) An appropriate combination of principal and emergency spillways shall be provided to safely discharge the runoff resulting from a 100-year, 24-hour precipitation event, or a larger event specified by the regulatory authority, plus any in-flow from the underground mine.

(ii) The embankment shall be designed and constructed with an acceptable static safety factor of at least 1.5, or a higher safety factor as designated by the regulatory authority to ensure stability.

(iii) Appropriate barriers shall be provided to control seepage along conduits that extend through the embankment.

(iv) The criteria of the Mine Safety and Health Administration as published in 30 CFR 77.216 shall be met.

(18) Each pond shall be designed and inspected during construction under the supervision of, and certified after construction by, a registered professional engineer.

(19) The entire embankment including the surrounding areas disturbed by construction shall be stabilized with respect to erosion by a vegetative cover or other means immediately after the embankment is completed. The active upstream face of the embankment where water is being impounded may be riprapped or otherwise stabilized. Areas in which the vegetation is not successful or where rills and gullies develop shall be repaired and revegetated, in accordance with § 717.20.

(20) All ponds, including those not meeting the size or other criteria of 30 CFR 77.216(a), shall be examined for structural weakness, erosion, and other hazardous conditions and reports and notifications shall be made to the regulatory authority, in accordance with 30 CFR 77.216–3. With the approval of the regulatory authority, dams not meeting these criteria (30 CFR 77.216(a)) shall be examined four times per year.

(21) Sedimentation ponds shall not be removed until the disturbed area has been restored and the vegetation requirements of § 715.20 are met and the drainage entering the pond has met the applicable State and Federal water quality requirements for the receiving stream. When the sedimentation pond is removed, the affected land shall be

regraded and revegetated in accordance with §§ 717.14 and 717.20, unless the pond has been approved by the regulatory authority for retention as compatible with the approved post-mining land use paragraph (k) of this section. If the regulatory authority approves retention, the sedimentation pond shall meet all the requirements for permanent impoundments of paragraph (k).

(22)(i) Where surface mining activities are proposed to be conducted on steep slopes, as defined in § 716.2 of this chapter, special sediment control measures may be followed if the person has demonstrated to the regulatory authority that a sedimentation pond (or series of ponds) constructed according to paragraph (e) of this section—

(A) Will jeopardize public health or safety; or

(B) Will result in contributions of suspended solids to streamflow in excess of the incremental sediment volume trapped by the additional pond size required.

(ii) Special sediment control measures shall include but not be limited to—

(A) Designing, constructing, and maintaining a sedimentation pond as near as physically possible to the disturbed area which complies with the design criteria of this section to the maximum extent possible.

(B) A plan and commitment to employ sufficient onsite sedimentation control measures including bench sediment storage, filtration by natural vegetation, mulching, and prompt revegetation which, in conjunction with the required sediment pond, will achieve and maintain applicable effluent limitations. The plan submitted pursuant to this paragraph shall include a detailed description of all onsite control measures to be employed, a quantitative analysis demonstrating that onsite sedimentation control measures, in conjunction with the required sedimentation pond, will achieve and maintain applicable effluent limitations, and maps depicting the location of all onsite sedimentation control measures.

(f) *Discharge structures.* Discharges from sedimentation ponds and diversion structures shall be controlled, where necessary, using energy

dissipators, surge ponds, and other devices to reduce erosion and prevent deepening or enlargement of stream channels and to minimize disturbances to the hydrologic balance.

(g) *Acid and toxic materials.* Drainage to ground and surface waters which emanates from acid-forming or toxic-forming mine waste materials and spoils placed on the land surface shall be avoided by—

(1) Identifying, burying, and treating where necessary, spoil or other materials that, in the judgment of the regulatory authority, will be toxic to vegetation or that will adversely affect water quality if not treated or buried. Such material shall be disposed in accordance with the provision of § 717.14(e);

(2) Preventing or removing water from contact with toxic-producing deposits;

(3) Burying or otherwise treating all toxic or harmful materials within 30 days if such materials are subject to wind and water erosion, or within a lesser period designated by the regulatory authority. If storage of such materials is approved, the materials shall be placed on impermeable material and protected from erosion and contact with surface water. Coal waste ponds and other coal waste materials shall be maintained according to paragraph (g)(4) of this section and § 717.18 shall apply;

(4) Burying or otherwise treating waste materials from coal preparation plants no later than 90 days after the cessation of the filling of the disposal area. Burial or treatment shall be in accordance with § 717.14(e) of this part;

(5) Casing, sealings, or otherwise managing boreholes, shafts, wells, and auger holes or other more or less horizontal holes to prevent pollution of surface or ground water and to prevent mixing of ground waters of significantly different quality. All boreholes that are within the permit area but are outside the surface coal mining area or which extend beneath the coal to be mined and into water-bearing strata shall be plugged permanently in a manner approved by the regulatory authority, unless boreholes have been approved for use in monitoring.

(h) *Ground water systems.* (1) Underground operations shall be conducted to minimize adverse effects on ground water flow and quality, and to minimize offsite effects. The permittee will be responsible for performing monitoring according to paragraph (h)(2) of this section to ensure operations conform to this requirement.

(2) Ground water levels, subsurface flow and storage characteristics, and the quality of ground water shall be monitored in a manner approved by the regulatory authority to determine the effects of underground coal mining operations on the quantity and quality of water in ground water systems at the mine area and in associated offsite areas. When operations are conducted in such a manner that may affect the ground water system, ground water levels and ground water quality shall be periodically monitored using wells which can adequately reflect changes in ground water quantity and quality resulting from such operations. Sufficient water wells must be used by the permittee. The regulatory authority may require drilling and development of additional wells if needed to adequately monitor the ground water system. As specified and approved by the regulatory authority, additional hydrologic tests, such as aquifer tests, must be undertaken by the permittee to demonstrate compliance with paragraph (h)(1) of this section.

(i) *Water rights and replacement.* The permittee shall replace the water supply of an owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial, or other legitimate use from an underground or surface source where such supply has been affected by contamination, diminution, or interruption proximately resulting from surface coal mine operation by the permittee.

(j) *Hydrologic impact of roads.* (1) *General.* Access and haul roads and associated bridges, culverts, ditches, and road rights-of-way shall be constructed, maintained, and reclaimed so as to the extent possible, using the best

technology currently available, prevent additional contributions of suspended solids to streamflow, or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall the contributions be in excess of requirements set by applicable State or Federal law. All haul and access roads shall be removed and the land affected shall be regraded and revegetated consistent with the requirements of §§ 717.14 and 717.20, unless retention of a road is approved and assured of necessary maintenance to adequately control erosion.

(2) *Construction.* (i) All roads, insofar as possible, shall be located on ridges or on flatter and more stable slopes to minimize erosion. Stream fords are prohibited unless they are specifically approved by the regulatory authority as temporary routes across dry streams that will not adversely affect sedimentation and that will not be used for coal haulage. Other stream crossings shall be made using bridges, culverts, or other structures designed and constructed to meet the requirements of this paragraph. Roads shall not be located in active stream channels nor shall they be constructed or maintained in a manner that increases erosion or causes significant sedimentation or flooding. However, nothing in this paragraph will be construed to prohibit relocation of stream channels in accordance with paragraph (d) of this section.

(ii) In order to minimize erosion and subsequent disturbances of the hydrologic balance, roads shall be constructed in compliance with the following grade restrictions or other grades determined by the regulatory authority to be necessary to control erosion:

(A) The overall sustained grade shall not exceed 1v:10h (10 percent).

(B) The maximum grade greater than 10 percent shall not exceed 1v:6.5h (15 percent) for more than 300 feet.

(C) There shall not be more than 300 feet of grade exceeding 10 percent within each 1,000 feet.

(iii) All access and haul roads shall be adequately drained using structures such as, but not limited to, ditches, water barriers, cross drains, and ditch relief drains. For access and haul roads

that are to be maintained for more than 1 year, water-control structures shall be designed with a discharge capacity capable of passing the peak runoff from a 10-year, 24-hour precipitation event. Drainage pipes and culverts shall be constructed to avoid plugging or collapse and erosion at inlets and outlets. Drainage ditches shall be provided at the toe of all cut slopes formed by construction of roads. Trash racks and debris basins shall be installed in the drainage ditches wherever debris from the drainage area could impair the functions of drainage and sediment control structures. Ditch relief and cross drains shall be spaced according to grade. Effluent limitations of paragraph (a) of this section shall not apply to drainage from access and haul roads located outside the disturbed area as defined in this section unless otherwise specified by the regulatory authority.

(iv) Access and haul roads shall be surfaced with durable material. Toxic or acid-forming substances shall not be used. Vegetation may be cleared only for the essential width necessary for road and associated ditch construction and to serve traffic roads.

(3) *Maintenance.* (i) Access and haul roads shall be routinely maintained by means such as, but not limited to, wetting, scraping, or surfacing.

(ii) Ditches, culverts, drains, trash racks, debris basins, and other structures serving to drain access and haul roads shall not be restricted or blocked in any manner that impedes drainage or adversely affects the intended purpose of the structure.

(4) Access roads constructed for and used only to provide infrequent service to surface facilities, such as ventilators or monitoring devices shall be exempt from the requirements of paragraph (j)(2) of this section provided adequate stabilization to control erosion is achieved through use of alternative measures.

(k) *Hydrologic impacts of other transport facilities.* Railroad loops, spurs, conveyors, or other transport facilities shall be constructed, maintained, and reclaimed to prevent additional contributions of suspended solids to streamflow, or to runoff outside the permit area to the extent possible, using the best technology currently

available and to control other diminution or degradation of water quality and quantity. In no event shall contributions be in excess of requirements set by applicable State or Federal law.

(l) *Discharge of waters into underground mines.* Surface and ground waters shall not be discharged or diverted into underground mine workings.

(Secs. 101, 102, 201, 501, 503-510, 515-517, 523, and 701, Surface Mining Reclamation Act of 1977, Pub. L. 95-87 (30 U.S.C. 1201, 1202, 1211, 1251-1260, 1265-1267, 1273, 1291))

[42 FR 62695, Dec. 13, 1977, as amended at 43 FR 8092, Feb. 27, 1978; 43 FR 21459, May 18, 1978; 44 FR 30632, May 25, 1979; 44 FR 36887, June 22, 1979; 44 FR 77452, Dec. 31, 1979]

EFFECTIVE DATE NOTE: A document published at 44 FR 77452, Dec. 31, 1979 suspended § 717.17(a)(3)(i) insofar as it applies to total suspended solids (TSS) discharges.

§ 717.18 Dams constructed of or impounding waste material.

(a) *General.* No waste material shall be used in or impounded by existing or new dams without the approval of regulatory authority. The permittee shall design, locate, construct, operate, maintain, modify, and abandon or remove all dams (used either temporarily or permanently) constructed of waste materials, in accordance with the requirements of this section.

(b) *Construction of dams.* (1) Waste shall not be used in the construction of dams unless demonstrated through appropriate engineering analysis, to have no adverse effect on stability.

(2) Plans for dams subject to this section, and also including those dams that do not meet the size or other criteria of § 77.216(a) of this title, shall be approved by the regulatory authority before construction and shall contain the minimum plan requirements established by the Mining Enforcement and Safety Administration pursuant to § 77.216-2 of this title.

(3) Construction requirements are as follows: (i) Design shall be based on the flood from the probable maximum precipitation event unless the permittee shows that the failure of the impounding structure would not cause loss of life or severely damage property or the environment, in which case, depending on site conditions, a design based on a precipitation event of no less than 100-

year frequency may be approved by the regulatory authority.

(ii) The design freeboard distance between the lowest point on the embankment crest and the maximum water elevation shall be at least 3 feet to avoid overtopping by wind and wave action.

(iii) Dams shall have minimum safety factors as follows:

Case	Loading condition	Minimum safety factor
I	End of construction	1.3
II	Partial pool with steady seepage saturation.	1.5
III	Steady seepage from spillway or decant crest.	1.5
IV	Earthquake (cases II and III with seismic loading).	1.0

(iv) The dam, foundation, and abutment shall be stable under all conditions of construction and operation of the impoundment. Sufficient foundation investigations and laboratory testing shall be performed to determine the factors of safety of the dam for all loading conditions in paragraph (b)(3)(iii) of this section and for all increments of construction.

(v) Seepage through the dam, foundation, and abutments shall be controlled to prevent excessive uplift pressures, internal erosion, sloughing, removal of material by solution, or erosion of material by loss into cracks, joints, and cavities. This may require the use of impervious blankets, pervious drainage zones or blankets, toe drains, relief wells, or dental concreting of jointed rock surface in contact with embankment materials.

(vi) Allowances shall be made for settlement of the dams and the foundation so that the freeboard will be maintained.

(vii) Impoundments created by dams of waste materials shall be subject to a minimum drawdown criteria that allows the facility to be evacuated by spillways or decants of 90 percent of the volume of water stored during the design precipitation event within 10 days.

(viii) During construction of dams subject to this section, the structures shall be periodically inspected by a